Title: VARIABLE GAIN VOLTAGE/CURRENT CONVERTER CIRCUIT HAVING CURRENT COMPENSATION CIRCUIT FOR COMPENSATING FOR CHANGE IN DC CURRENT FLOWING INTO ACTIVE ELEMENT FOR PERFORMING VOLTAGE/CURRENT CONVERSION
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DOCKET NO.: 040373-0389

Fig. 1A

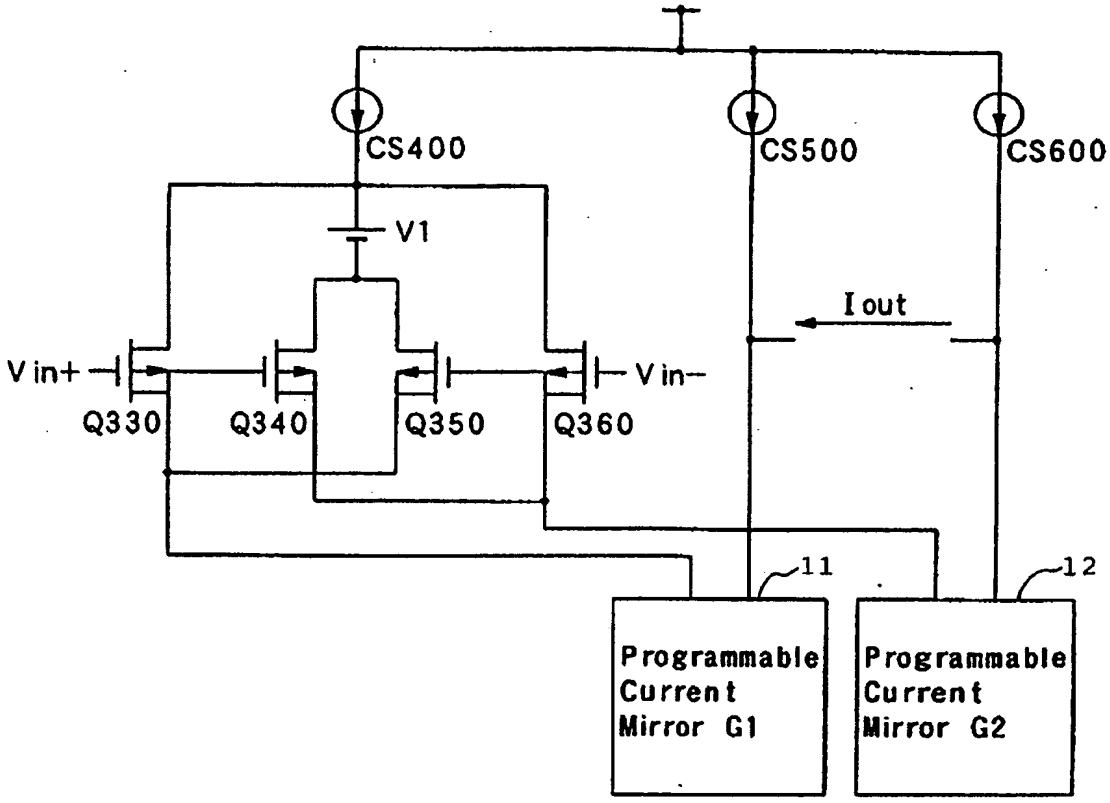

Fig. 1B

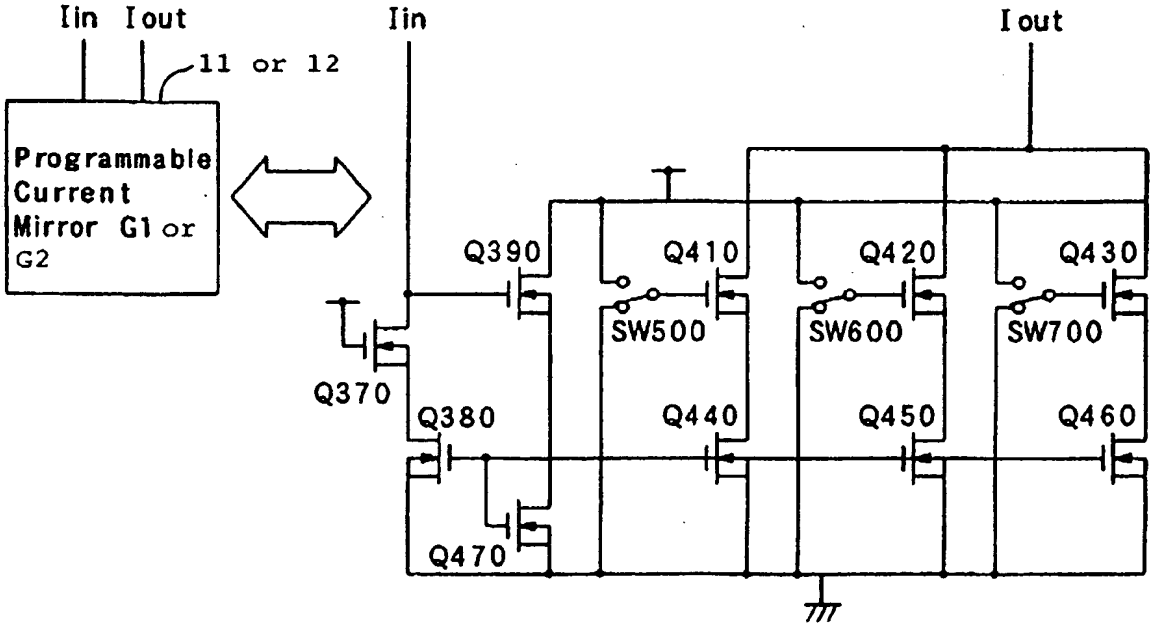

Fig. 2

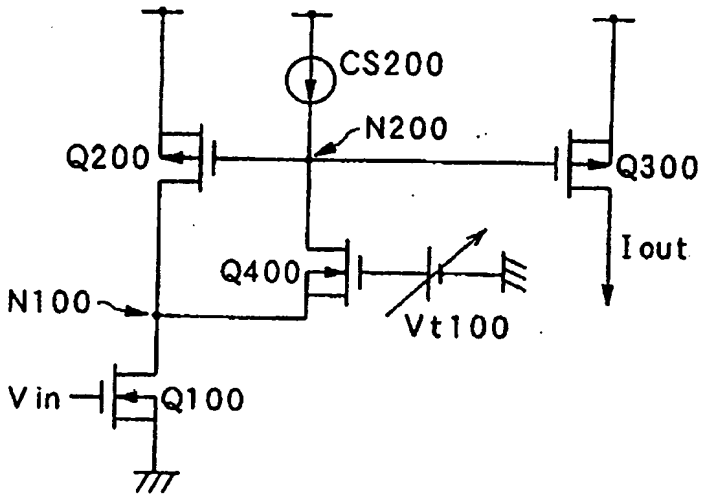
CS200
N200
Q200
Q300
Iout
Q400
Vt100
N100
Vin
Q100

Fig. 3A

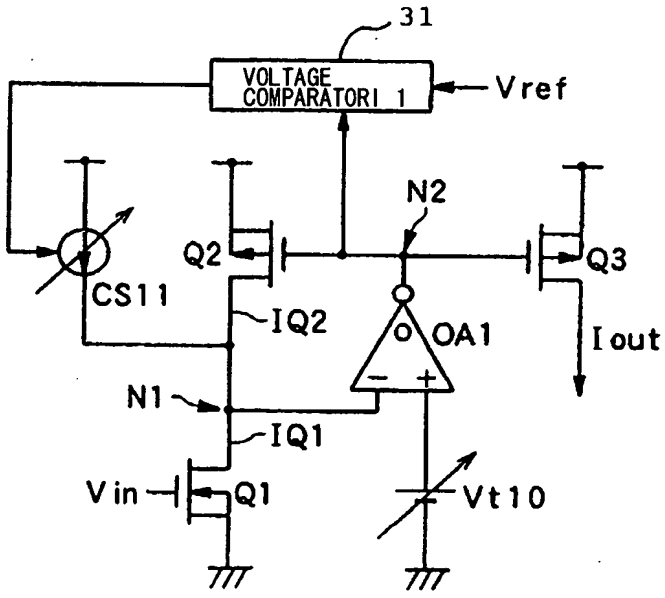
31
VOLTAGE COMPARATOR1 1
Vref
N2
Q2
Q3
CS11
IQ2
OA1
Iout
N1
IQ1
Vin
Q1
Vt10

Fig. 3B

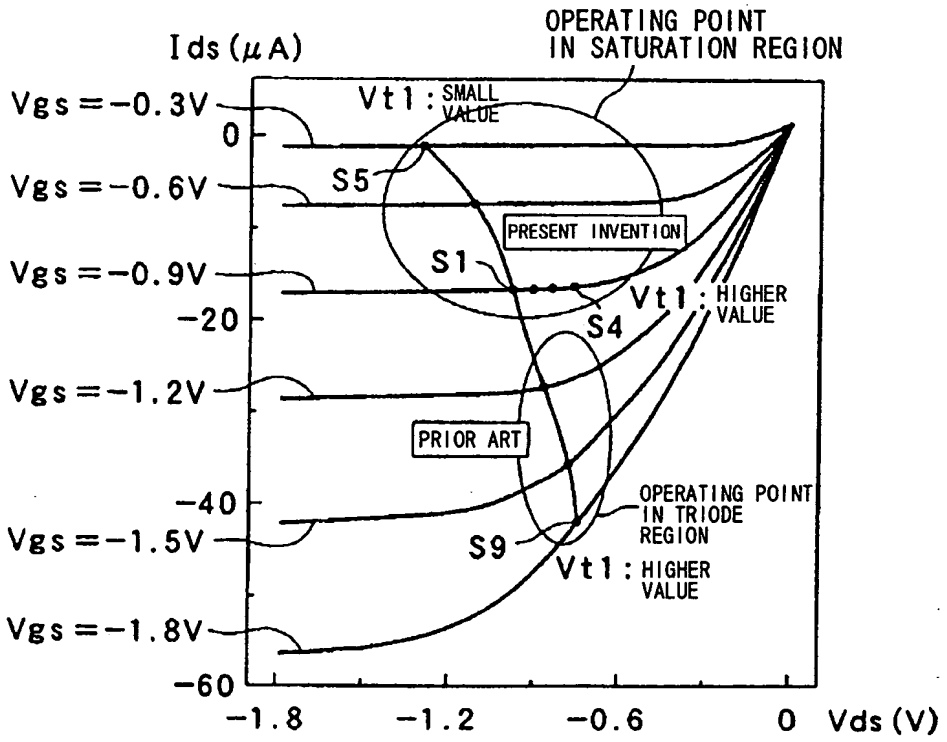
Ids (μA)
OPERATING POINT IN SATURATION REGION
Vgs = −0.3V
0
Vgs = −0.6V
Vgs = −0.9V
−20
Vgs = −1.2V
−40
Vgs = −1.5V
Vgs = −1.8V
−60
Vt1 : SMALL VALUE
S5
PRESENT INVENTION
S1
S4
Vt1 : HIGHER VALUE
PRIOR ART
OPERATING POINT IN TRIODE REGION
S9
Vt1 : HIGHER VALUE
−1.8
−1.2
−0.6
0
Vds (V)

Fig. 4

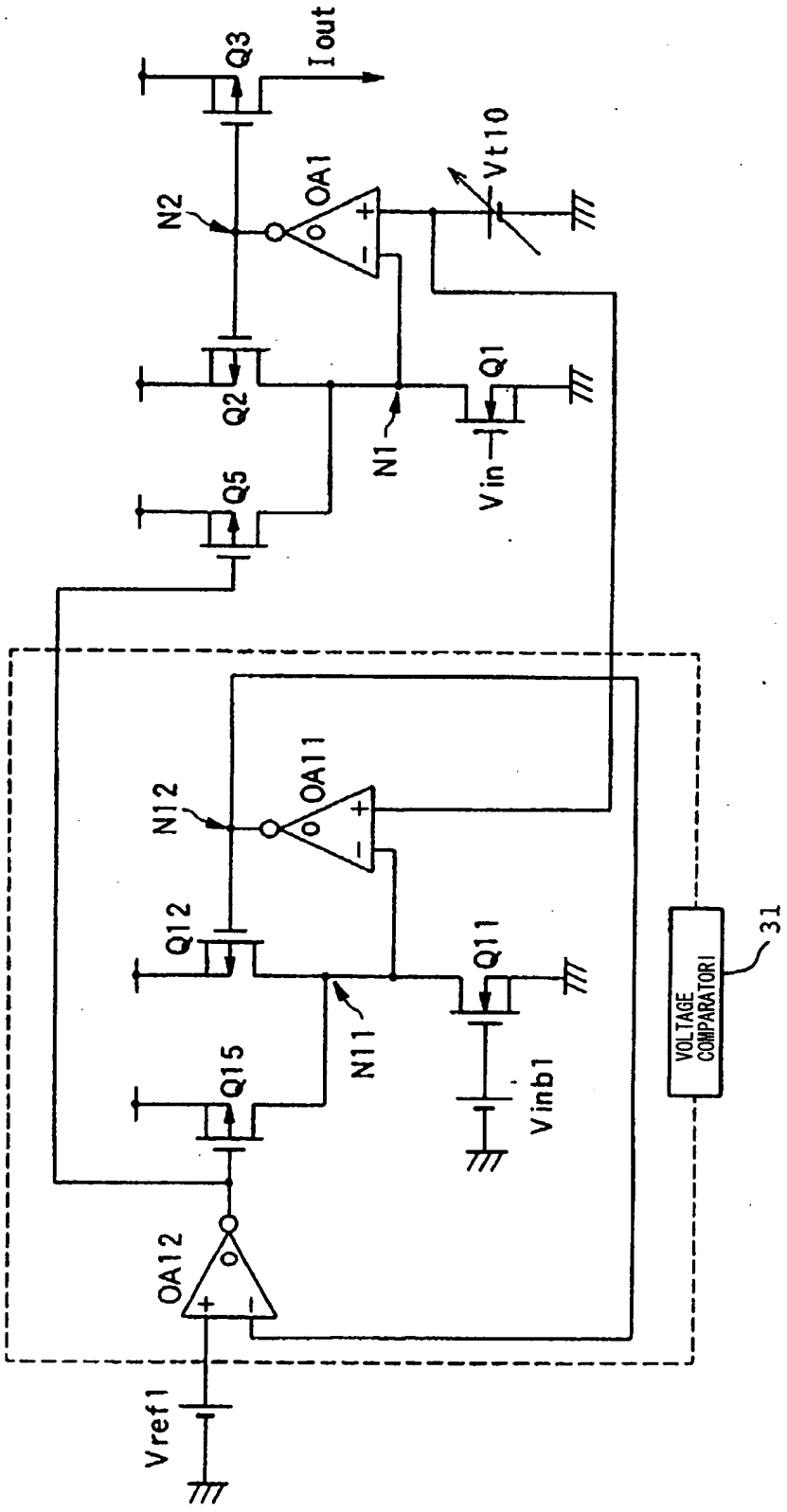
Q3
Iout
OA1
N2
Vt10
Q2
Q1
N1
Vin
Q5
OA11
N12
Q12
Q11
N11
Q15
Vinb1
VOLTAGE COMPARATOR1
31
OA12
Vref1

Fig. 5

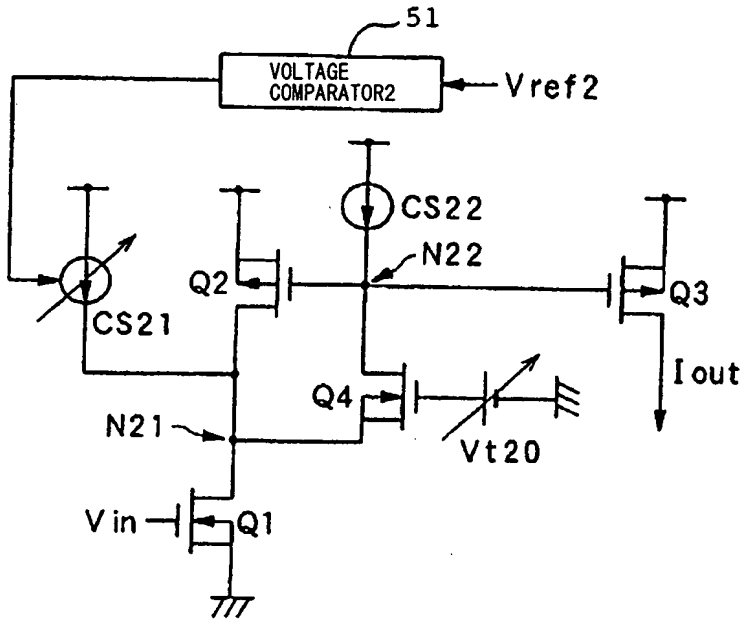
51
VOLTAGE COMPARATOR2
Vref2
CS22
N22
Q2
Q3
CS21
Iout
Q4
N21
Vt20
Vin
Q1

Fig. 6

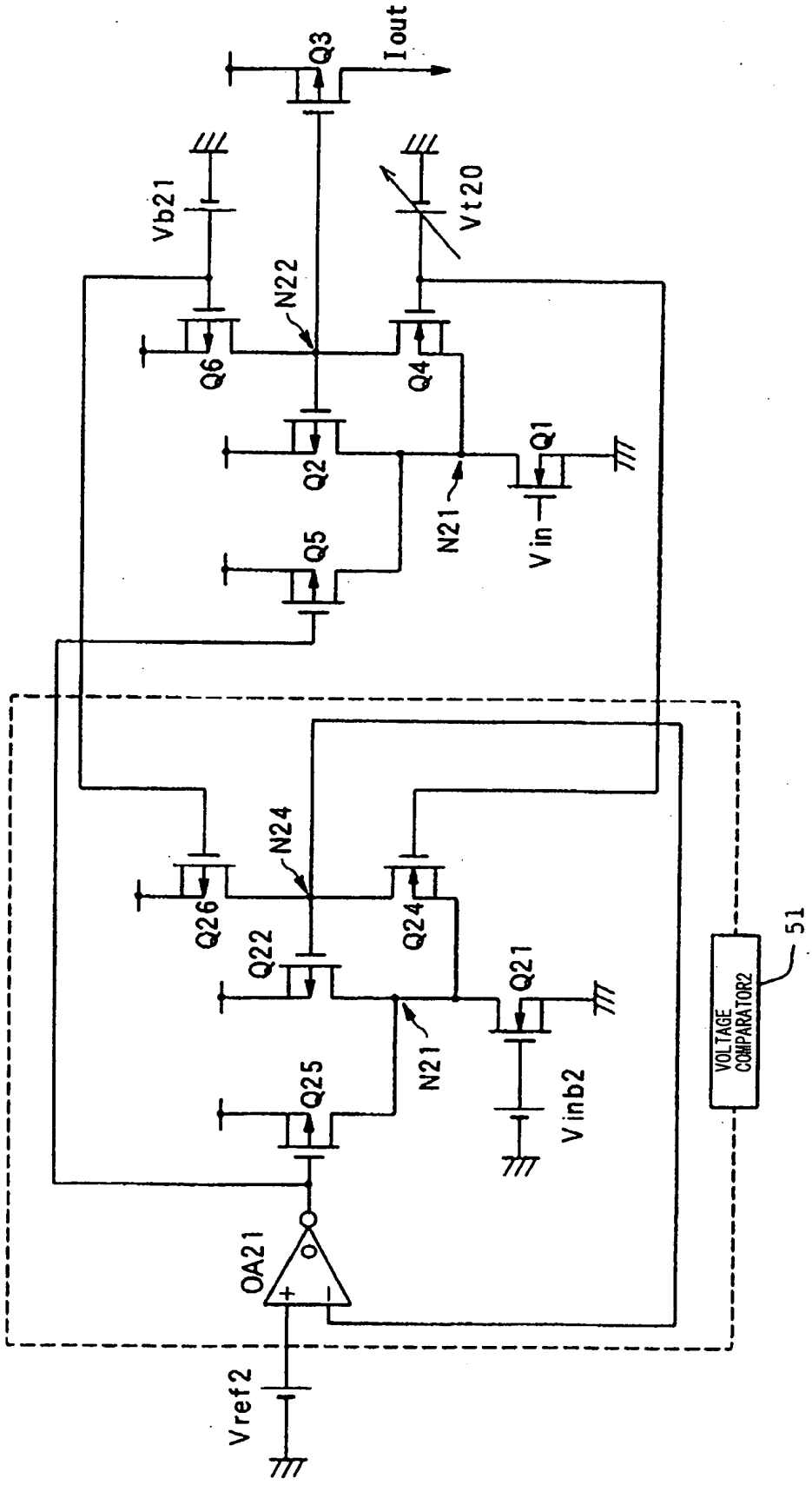
Q3
Iout
Vb21
Vt20
N22
Q6
Q4
Q2
Q1
N21
Vin
Q5
N24
Q26
Q24
Q22
Q21
N21
Vinb2
Q25
VOLTAGE COMPARATOR2
51
OA21
Vref2

Fig. 7

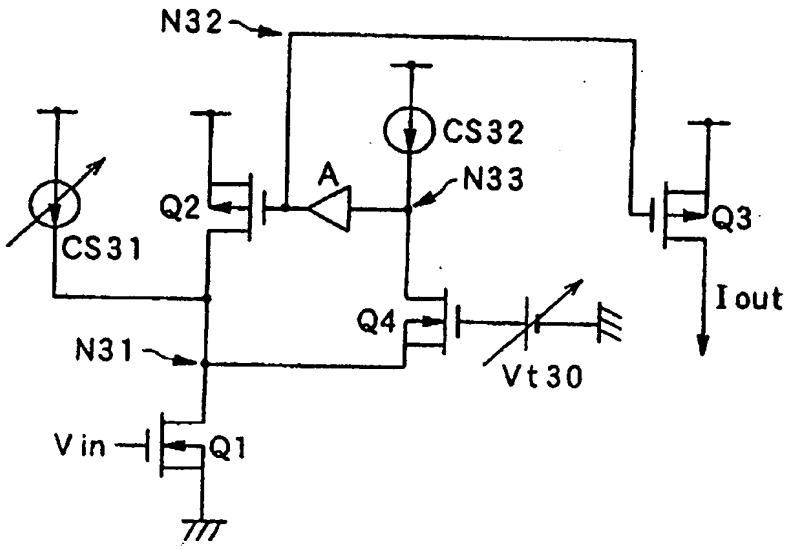

Fig. 8

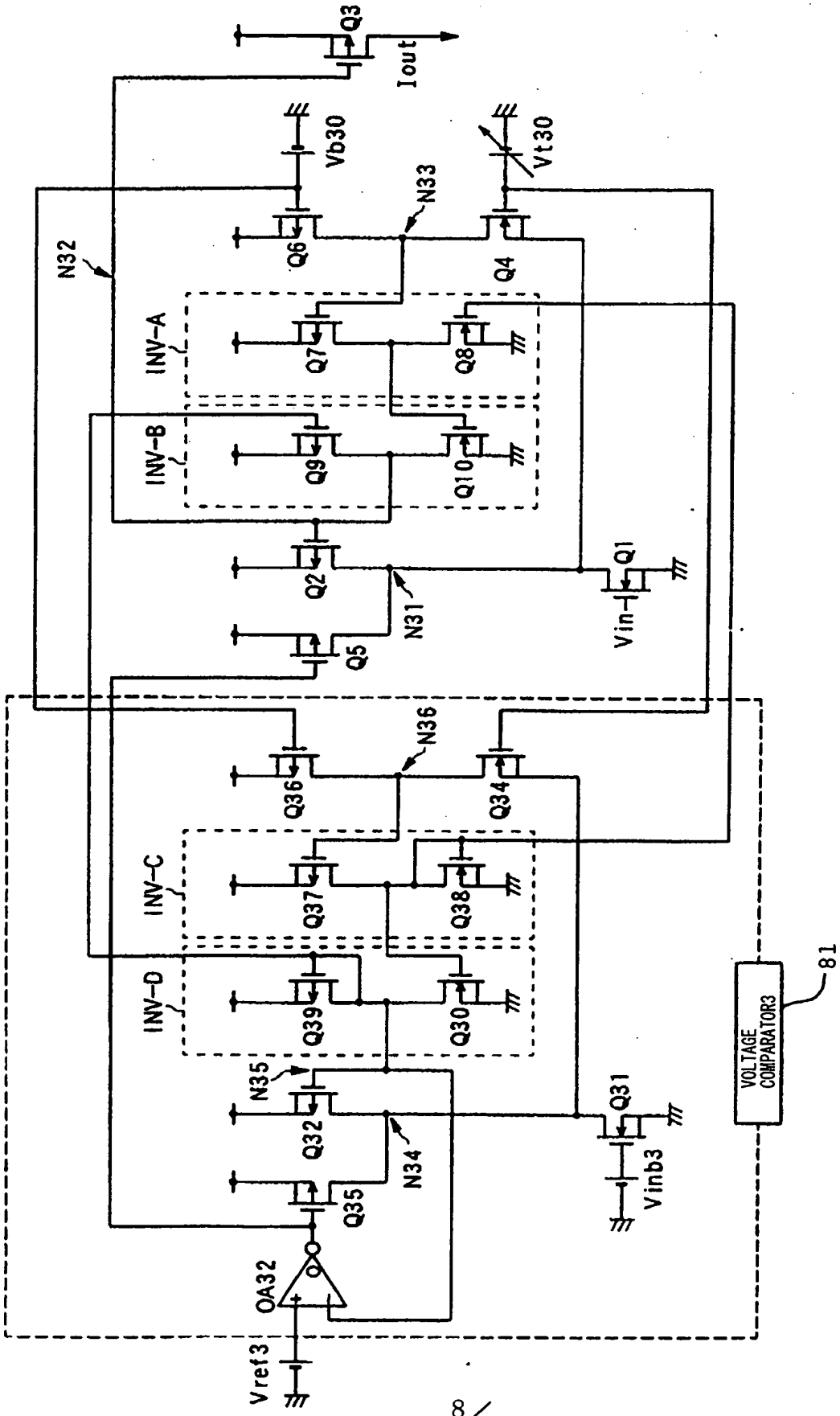
Q3
Iout
Vb30
Vt30
N33
N32
Q6
Q4
INV-A
Q7
Q8
INV-B
Q9
Q10
Q2
Q1
Vin
N31
Q5
N36
Q36
Q34
INV-C
Q37
Q38
INV-D
Q39
Q30
81
VOLTAGE COMPARATOR3
N35
Q31
Q32
N34
Vinb3
Q35
OA32
Vref3

Fig. 9A

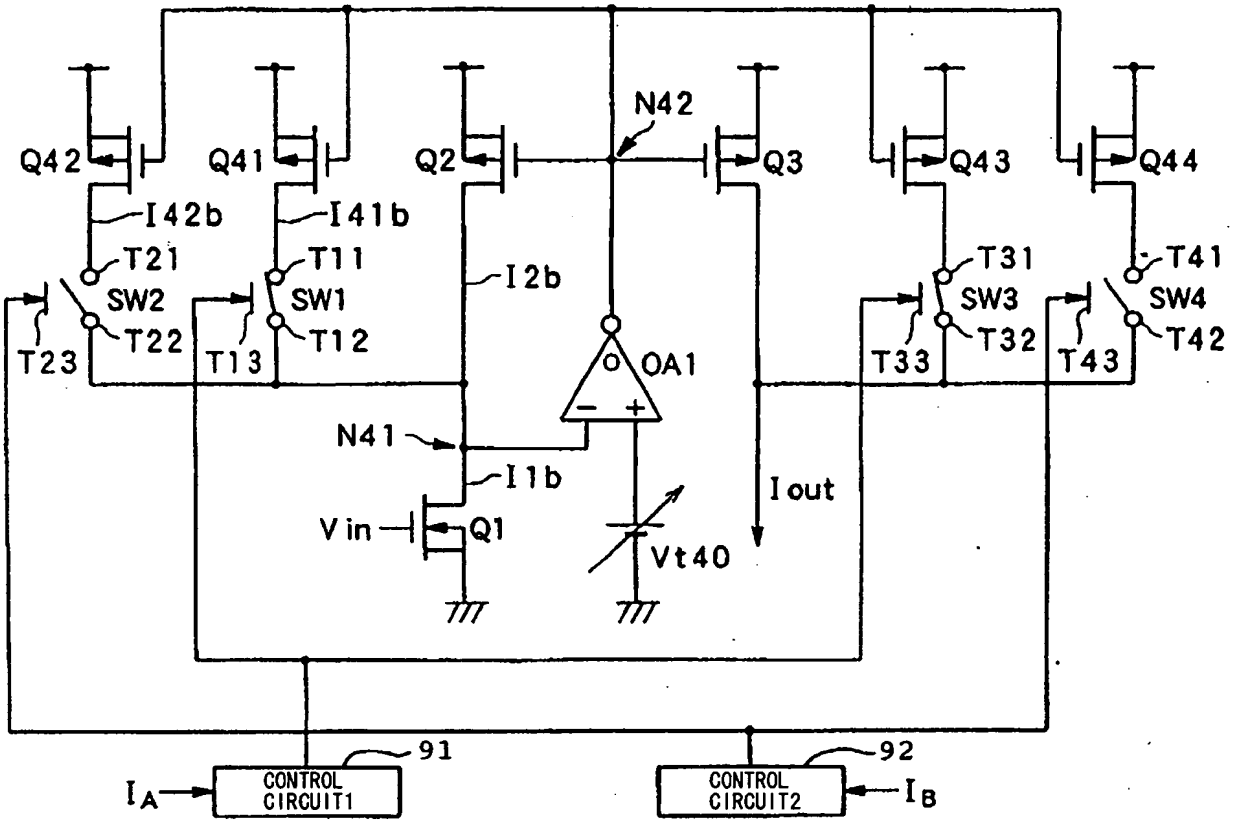
Q42
Q41
Q2
N42
Q3
Q43
Q44
I42b
I41b
T21
T11
I2b
T31
T41
SW2
SW1
SW3
SW4
T23
T22
T13
T12
OA1
T33
T32
T43
T42
N41
I1b
Iout
Vin
Q1
Vt40
91
92
CONTROL CIRCUIT1
CONTROL CIRCUIT2
IA
IB

Fig. 9B

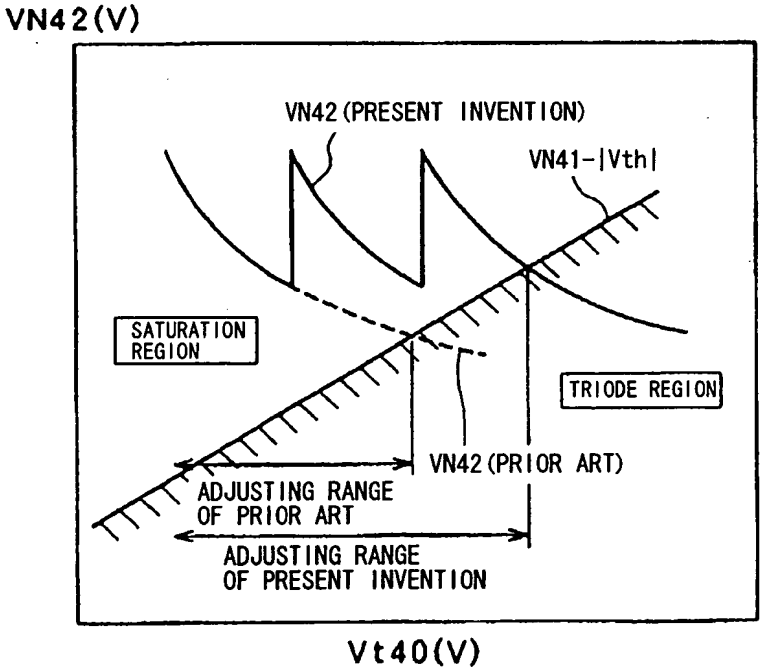
VN42(V)
VN42(PRESENT INVENTION)
VN41-|Vth|
SATURATION REGION
TRIODE REGION
VN42(PRIOR ART)
ADJUSTING RANGE OF PRIOR ART
ADJUSTING RANGE OF PRESENT INVENTION
Vt40(V)

Fig. 10

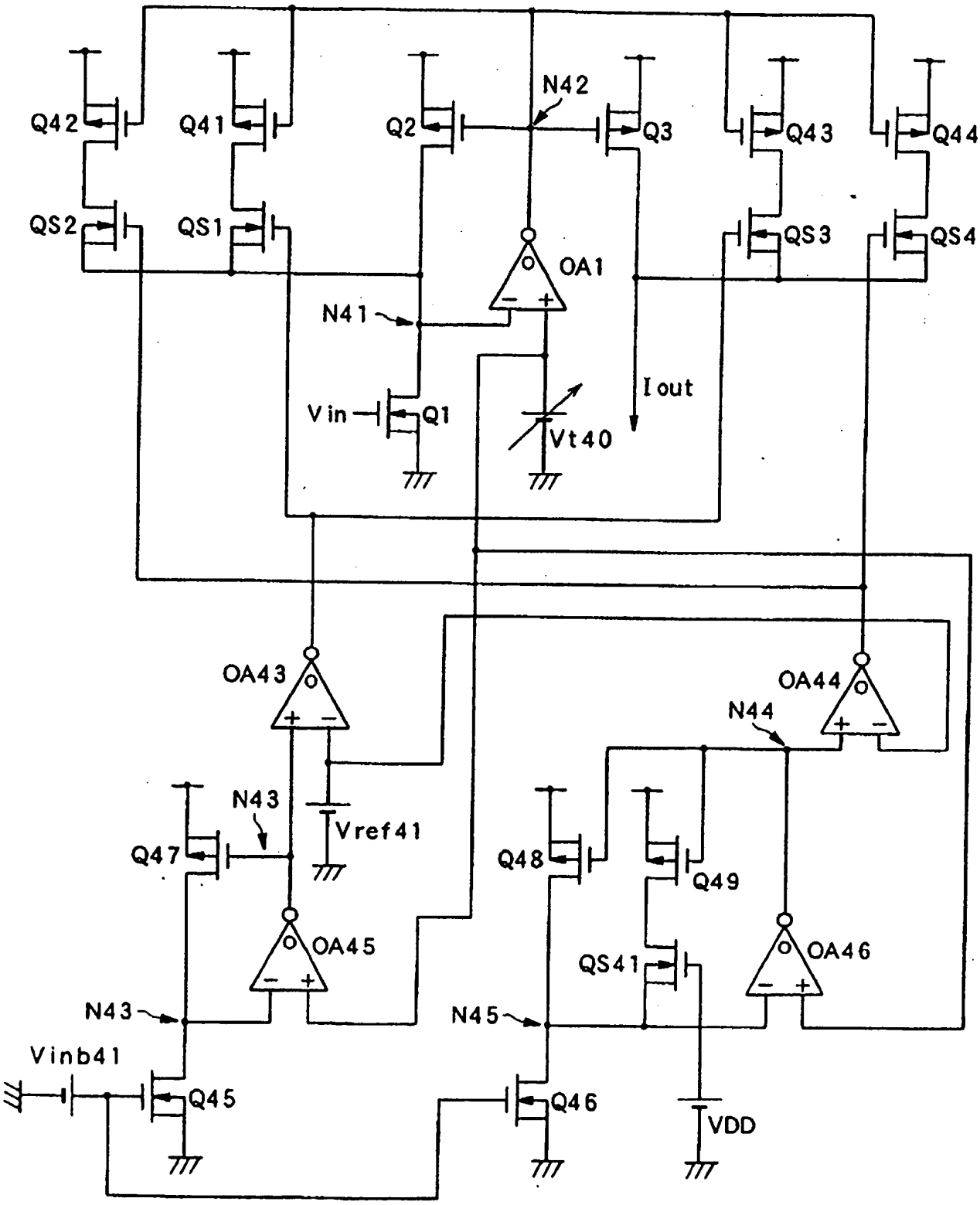
Q42
Q41
Q2
N42
Q3
Q43
Q44
QS2
QS1
QS3
QS4
OA1
N41
Vin
Q1
Vt40
Iout
OA43
OA44
N44
N43
Vref41
Q47
Q48
Q49
OA45
OA46
QS41
N43
N45
Vinb41
Q45
Q46
VDD

Fig. 11

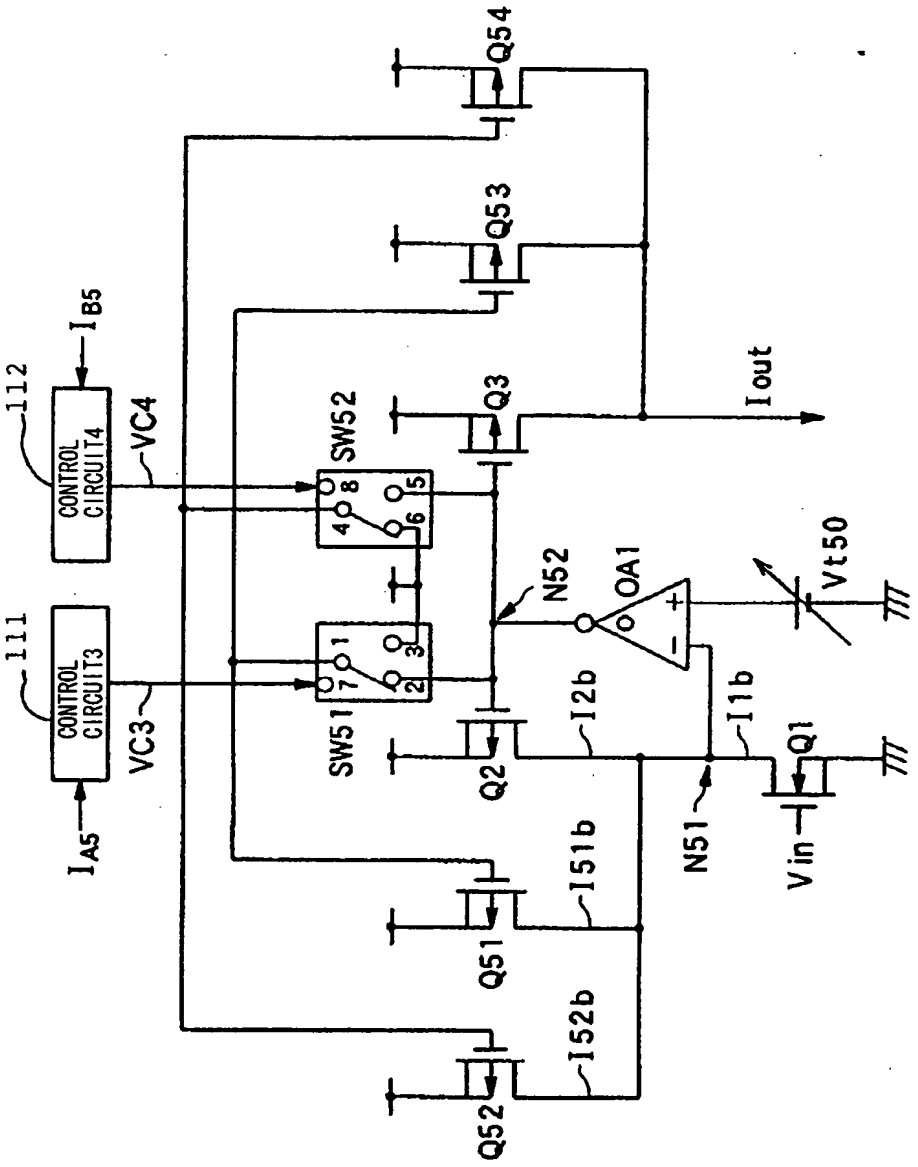
Q54
Q53
Q3
Iout
IB5
112
CONTROL CIRCUIT4
VC4
SW52
N52
OA1
Vt50
111
CONTROL CIRCUIT3
VC3
SW51
I2b
I1b
Q1
Q2
IA5
N51
Vin
I51b
Q51
I52b
Q52

Fig. 12

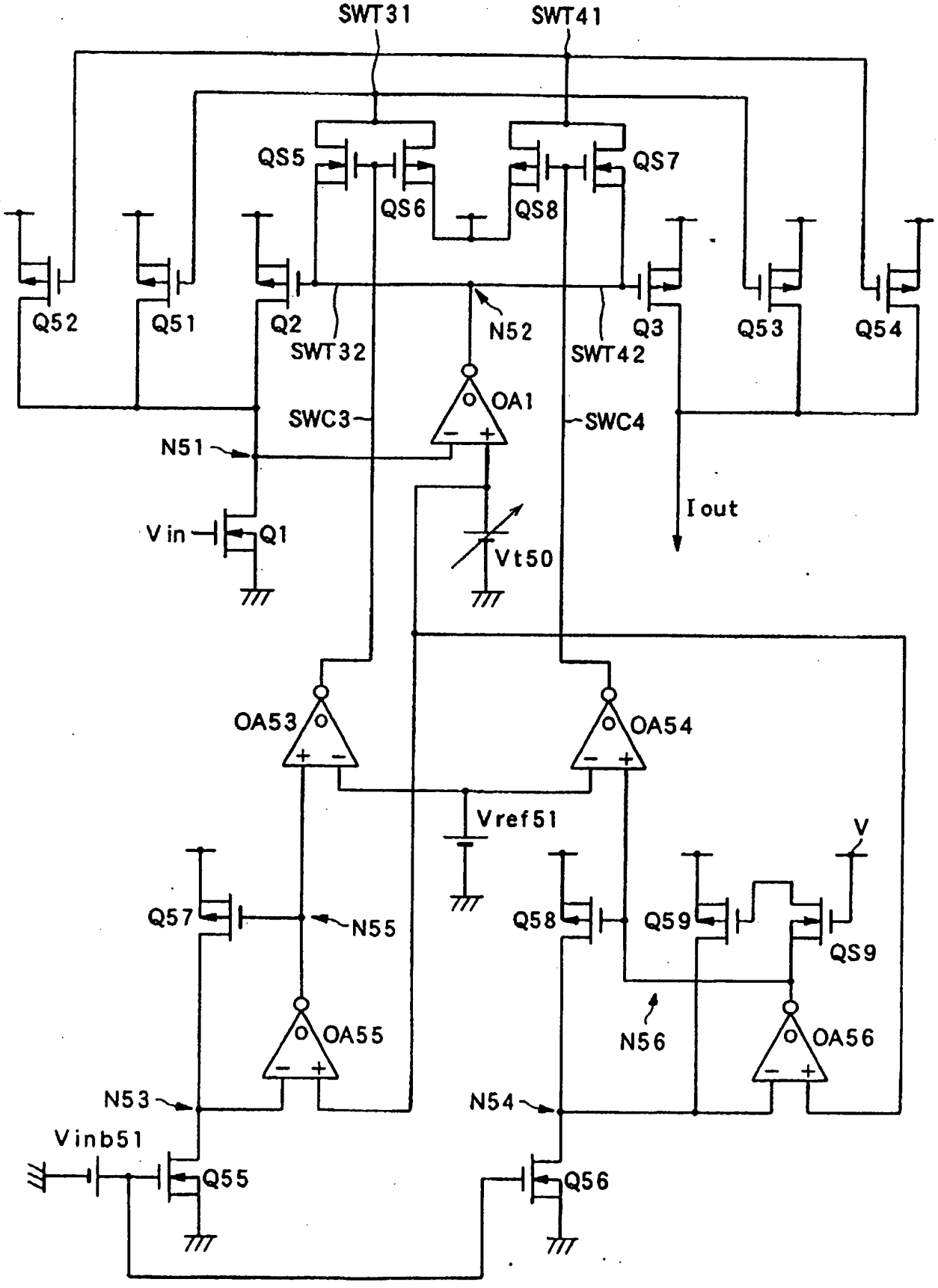
SWT31
SWT41
QS5
QS6
QS7
QS8
Q52
Q51
Q2
SWT32
N52
Q3
SWT42
Q53
Q54
OA1
SWC3
SWC4
N51
Iout
Vin
Q1
Vt50
OA53
OA54
Vref51
V
Q57
N55
Q58
Q59
QS9
N56
OA55
OA56
N53
N54
Vinb51
Q55
Q56

Fig. 13A

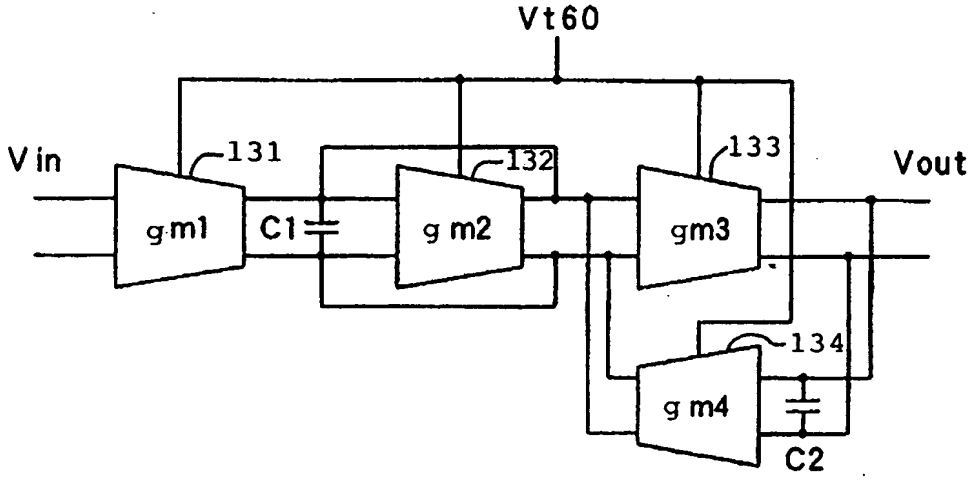

Fig. 13B

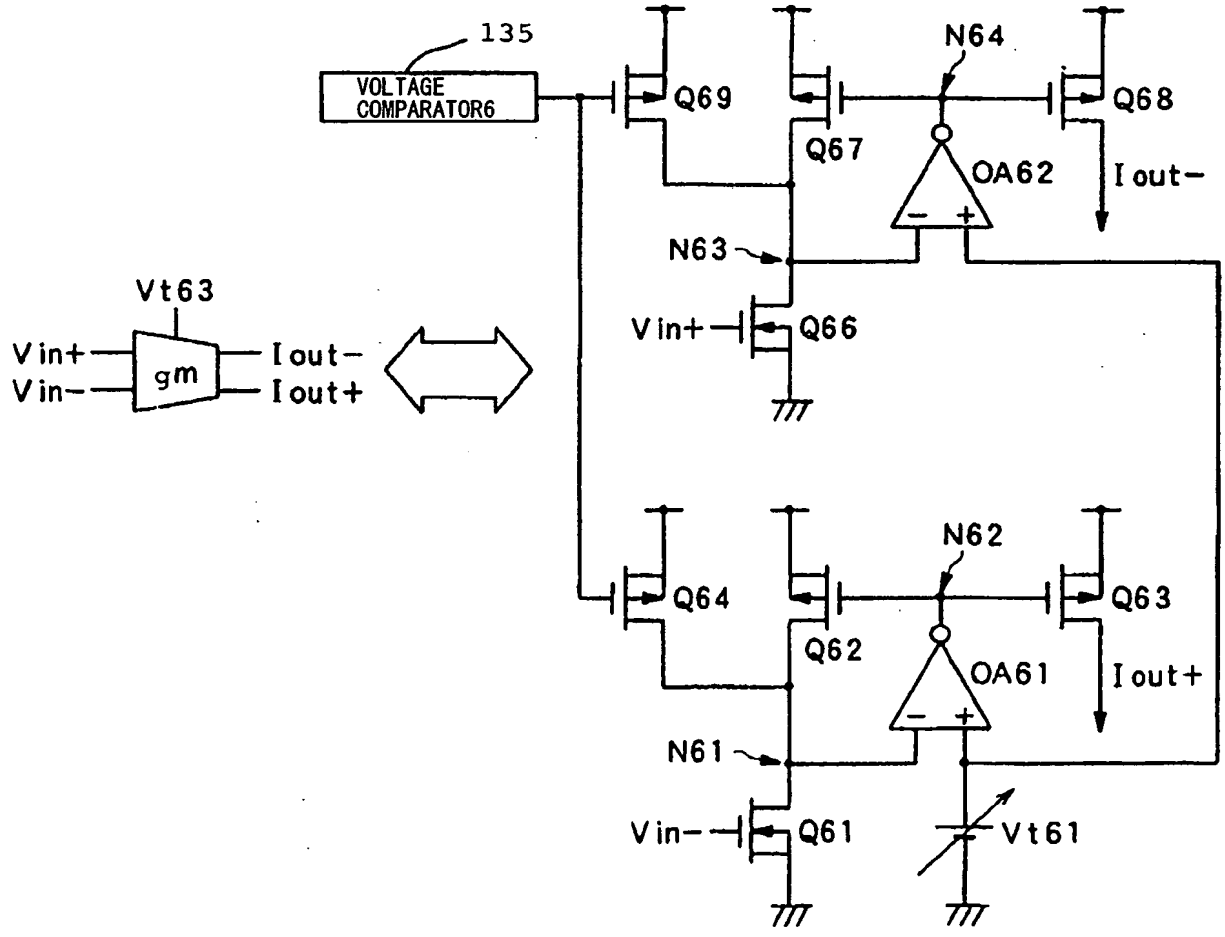

Fig. 14